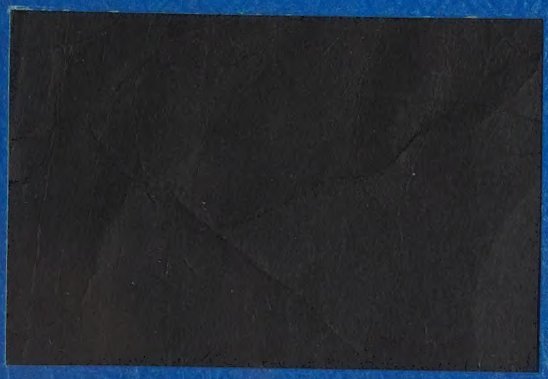
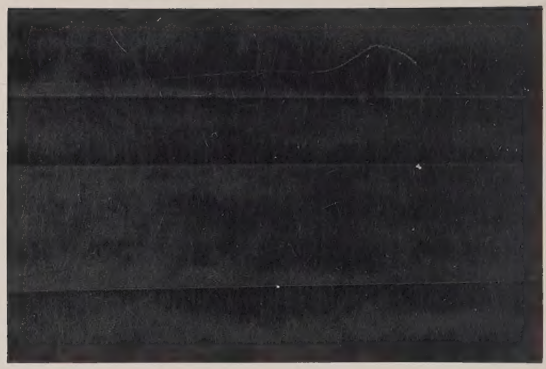


Operating and Maintenance Instruction Manual

Cole-Parmer Instrument Co.
7425 North Oak Park Ave.
Chicago, Illinois 60648
312/647-7600

MP MASTER
MA34829



SEL

DIGITAL THERMOCOUPLE THERMOMETER

Model 8529-00

Cole-Parmer Instrument Co.
7425 North Oak Park Avenue
Chicago, Illinois 60648

A-1299-151
Edition 1183

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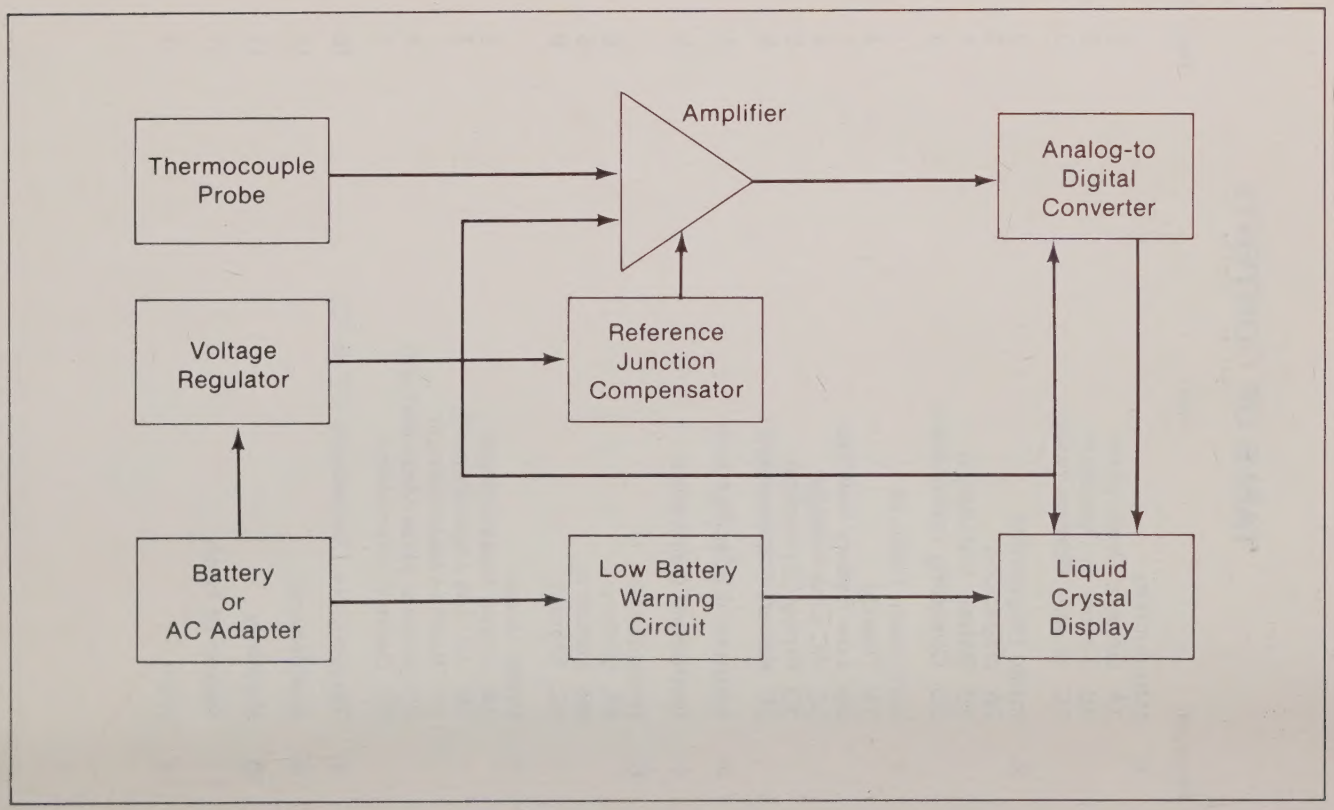


Circuit Block Diagram

1. INTRODUCTION

1A. General Description

This °F/°C Thermocouple Thermometer incorporates a reference junction compensator to provide a high level of accuracy. Solid state circuitry operating an "LCD" display provides easy viewing with a minimum of power consumption. The unit can be operated with the internal battery or an AC line adapter.

1B. Theory of Operation

The instrument contains three basic sub-systems. They are the reference junction compensator, the amplifier, and the analog-to-digital converter. The reference junction compensator consists of a silicon temperature sensor biased so that its voltage is equal to, but opposite in polarity to the thermocouples reference junction voltage. The resulting output compensates for changes in instrument ambient temperatures.

The analog-to-digital converter contains all of the necessary circuitry to convert the input voltage into a full 3½ digit LCD display.

1C. Quality Control Tests

To insure trouble free operation, the instruments are extensively tested. After calibration, every unit is subjected to a "burn in" where the ambient temperature is cycled while the unit is operating. This allows marginal components to be discovered and replaced, minimizing field failures. The units are then recalibrated and inspected before shipping.

2. INITIAL PREPARATION

2A. Unpacking

The carton will contain the thermometer, battery and the manual. Carefully inspect during unpacking. Report any damage to the carrier and enter a claim.

2B. Battery Installation

The battery used is a standard 9v battery. As a precaution, carefully inspect before installation. Discard any that show signs of cracks or leakage. To install battery, first remove bottom compartment snap-out/snap-in cover with a wide blade screwdriver or a suitable coin (a dime is a good fit). Insert tool in slot and pry forward. The battery symbol in the compartment with the polarities indicated are correct when the connector leads are properly dressed behind the battery. Connect the battery snap to the battery and insert assembly into compartment with the leads under the battery. Insert snap-in covers triple locking tabs in case and press cover closed.

2C. Operating Instructions

Select a thermocouple probe which is appropriate for the medium to be measured: air, liquid, or solid (see Probe Usage Section). Insert the probe plug into the socket in the top of the instrument. Pushing slide switch to the left will turn the unit "on" and display °C; pushing the switch to the right will display °F.

3. INSTRUMENT FEATURES

3A. Display

A Liquid Crystal Display (LCD) has been chosen due to its low current drain, and hence long battery life.

3B. Low Battery Indicator

A portion of the instrument's circuitry continuously monitors the battery voltage when the unit is on. If the "Low Batt" notation is present (the left side of the display), the batteries should be replaced, to maintain the units accuracy.

3C. AC Line Adapter

This optional piece of equipment permits the instrument to be operated from an AC power source. When inserted into the unit, the battery is disconnected. The adapter only powers the unit; it does not recharge the battery. Two adapters are available. Use the 5985-10 for 115v, 50-60Hz, and the 5985-15 for 230v, 50-60Hz line voltage. Do not use other than the above adapters or damage may result.

3D. Probe Connection

The probe socket is on the "top" of the case, above the display. It has two flat blade contacts. Only type K thermocouples should be used with this instrument. For identification, both the socket and the mating thermocouple plugs are yellow plastic.

3E. Battery Replacement

To maintain the instrument accuracy, the battery will have to be replaced periodically. The useful life of a battery greatly exceeds 100 hours. See step 2B for installation instructions.

4. INSTRUMENT SPECIFICATIONS

Accuracy:	Within 1% of reading ± 1 count 0°C to +1100°C
Readability:	1°
Display Update Rate:	2.5/second
Temperature Range:	-60°F to +2000°F in 1° (8520-40) -50°C to +1100°C in 1° (8520-50)
Ambient Limits:	32°F to 122°F (0°C to 50°C)
Thermocouple:	Type K (Chromel-Alumel)
Physical Dimensions:	Size: 6"L x 3"W Weight: 8½ ounces
Storage Limits:	-4°F to +149°F -20°C to +65°C
Digit Size:	0.35" high

5. INSTRUMENT CALIBRATION

As discussed in the Theory of Operation, three different subsystems have to be carefully calibrated for the instrument to make an accurate measurement. Under normal usage, the instrument will not need re-calibration. If the unit has been accidentally damaged, the manufacturer will recalibrate it, for a nominal charge.

6. PRECAUTIONS

6A. Battery

When installing a new battery, proper polarity must be observed. The instrument is designed to tolerate improper battery connection but it will not function. However, even momentary improper insertion will reduce battery life.

6B. Handling

Although the instrument is ruggedly designed, severe blows, shocks, or vibration should be avoided if possible. A fall from a table or bench could result in permanent damage.

6C. Storage

For prolonged storage, it is suggested that the battery should be removed to eliminate the possibility of instrument damage due to battery acid leakage.

7. PROBE USAGE

Accurate temperature measurement requires the proper selection and use of the appropriate probe. The probes displayed in this manual indicate the large variety that is available. The following notes should assist in selecting the proper probe.

7A. Liquid Measurement

To prevent inaccurate readings due to stratification, the liquid should be stirred continuously. Due to a loss of heat along the probe sheath, the depth of probe immersion is important. A suggested rule to follow is to immerse the probe a minimum distance equal to 10 times the sheath diameter.

7B. Air/Gas Measurement

The small mass of the air probe allows small temperature fluctuations to be monitored. Some general purpose probes, such as those designed for liquid measurement, contain too much mass for them to follow small temperature changes.

7C. Surface Measurement

Several possible configurations exist. Probes having a flat surface can be bolted into position. A wire thermocouple can be cemented onto the surface (use a thermally conductive cement).

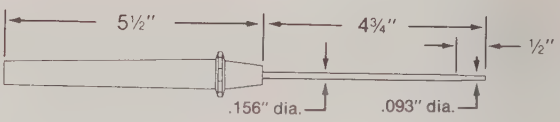
7D. Interior Mass Measurement

Wire thermocouples can be inserted into a mixture while it is still in a liquid state and allowed to harden in place. Probes having a pointed tip can be used for deep insertion into semi-solids such as fruit or soil.

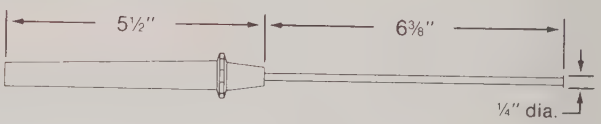
7E. General Information

Due to differences in materials and methods of construction, the maximum operating temperature of some of the probes is limited. Do not exceed these limits. Also, of those probes having cords, please note that all cord lengths are not identical. Refer to the following table for exact values.

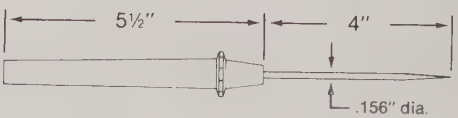
Probe Catalog No.	Maximum Temp.	Cord Length
8520-55	1652°F/900°C	36"
8520-60	800°F/430°C	36"
8520-65	932°F/500°C	36"
8520-70	2012°F/1100°C	72"
8520-75	572°F/300°C	36"
8520-80	2012°F/1100°C	48"
8520-85	1652°F/900°C	60"
8520-90	482°F/250°C	120"
8520-95	482°F/250°C	36"



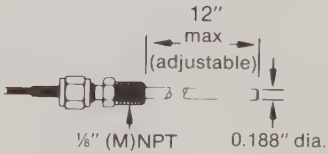
General Purpose Probe
8520-55



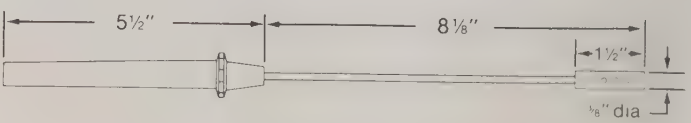
Surface Temperature Probe
8520-60



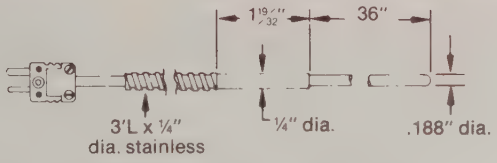
Needle Penetration Probe
8520-65



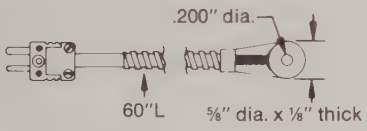
Pipe Fitting Probe
8520-70



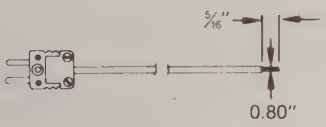
Air Temperature Probe
8520-75



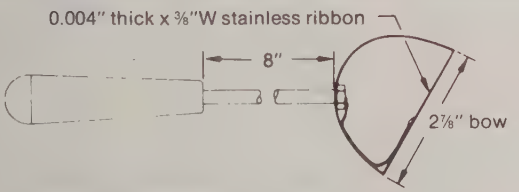
High Temperature-Heavy Duty Probe
8520-80



Bolt-On Washer Type Probe
8520-85



Bare Thermocouple Probe
8520-90



Roller-Surface Band Probe
8520-95

NOTE:

To conserve space, some probes are shown without a plug, but **all** probes are provided with a plug.

8. TEMPERATURE CONVERSION

Fahrenheit to Celsius
(°F - 32) x 5/9 = °C

Celsius to Fahrenheit
(°C x 9/5) + 32 = °F

The above formulas will provide an accurate conversion between the two forms of temperature measurement. As a quick alternate method, consult the table below.

°F	°C	°F	°C
-58	-50	977	525
-13	-25	1022	550
+32	0	1067	575
77	+25	1112	600
122	50	1157	625
167	75	1202	650
212	100	1247	675
257	125	1292	700
302	150	1337	725
347	175	1382	750
392	200	1427	775
437	225	1472	800
482	250	1517	825
527	275	1562	850
572	300	1607	875
617	325	1652	900
662	350	1697	925
707	375	1742	950
752	400	1787	975
797	425	1832	1000
842	450	1877	1025
887	475	1922	1050
932	500	2012	1100

9. MAINTENANCE

The outside of the instrument case can be wiped clean with a soft, lint free cloth dampened (not dripping wet) with a mild detergent. Do not attempt to use solvents on either the case or LCD lens. Periodically examine the batteries. Replace any that show signs of cracking or leakage. Aside from the batteries, these instruments do not contain user repairable components.

10. WARRANTY

The warranty card must be properly filled out and returned. The manufacturer warrants this product to be free from defects in material and workmanship for a period of six months. If repair or adjustment is necessary and has not been the result of abuse or misuse within the six month period, please return, freight prepaid, and correction of the defect will be made without charge. (see note on return of items). Out-of-warranty products will be repaired for a nominal charge.

11. RETURN OF ITEMS

Authorization must be obtained from our Customer Service Department before returning items for any reason. When applying for authorization, please include data regarding the reason the items are to be returned. A 15% restocking charge will be made on all returns resulting from customer errors in ordering.

For your protection, items being returned must be **carefully packed** to prevent damage in shipment and insured against possible damage or loss. We will not be responsible for damage resulting from careless or insufficient packing.

12. NOTE

We reserve the right to make improvements in design, construction, and appearance of our products without notice.

NOTES

MP MASTER
MA34829

B-1864